MYXOMYCETES FROM THE EVERGLADES NATIONAL PARK AND ADJACENT AREAS, I.[1]

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ABSTRACT

A first list of 10 species of slime molds from the Everglades National Park is presented; this list includes the first report of *Arcyria pomiformis* from Florida. From areas outside the park 7 species new to Florida are reported: *Comatricha subcaespitosa, Didymium listeri, Didymium ovoideum, Physarum galbeum, Stemonitis herbatica, Dictydiaethalium dictyosporum, Stemonitis inconspicua.* The last 2 species were previously known, respectively, only from the type collection and only from the Netherlands and the British Isles. These additions bring to 132 the total number of Myxomycetes reported from Florida in the literature. Taxonomic notes are given for an undescribed species of *Licea* formerly identified and reported from Florida as *Licea fimicola.*

There are few records of Myxomycetes for the southeastern United States. From the checklists compiled by West (1939) and by Alexopoulos (1953) a total of at least 84 species is known from Florida. In addition, Hagelstein, in his treatise of Mycetozoa of North America (1944), lists 19 species as being specifically from Florida. And lastly, Martin and Alexopoulos (1969) list 10 species of Myxomycetes, not mentioned by the previous authors, as occurring as far south as Florida. This brings to 113 the total number of Myxomycetes that are cited in the literature as being specifically from Florida. However, the range of distribution is given in more general geographical designations by Hagelstein (1944) and by Martin and Alexopoulos (1969), commonly as "throughout eastern United States" or "common throughout North America" by the former and "widely distributed in North America" or "cosmopolitan" by the latter. Approximately 50 species of slime molds may be included in these categories. An inventory of all slime mold specimens deposited in the National Fungus Collections, Beltsville, Maryland, the University of Florida Myxomycete Collection, Gainesville, Florida, and the University of Iowa Myxomycete Collection, Iowa City, Iowa, included 11 voucher specimens for the common and cosmopolitan species. This brings to 124 the total species of slime molds either being listed specifically from Florida or for which voucher specimens exist in the herbaria noted above. To my knowledge there have been no published records of slime molds from the Everglades National Park.

This park has a landscape characterized by a shallow covering of water and raised hammocks. Average annual rainfall is 55 inches, coming mostly in the wet season from February through October. All months have a mean monthly temperature above 60°F.

The collections reported herein, unless otherwise indicated, came from Royal Palm Hammock, which lies within the boundaries of the park and Dade County, Florida. This station is the only example of climax broad-leaved tropical forest in the national park system of the United States. Many of the flowering plants found here have a West Indian origin and are found nowhere else in this country.

In this first in a series of papers dealing with the Myxomycetes of the southeastern Gulf States, eight species are listed as new to Florida. In addition, taxonomic notes are given for an undescribed species of *Licea* tentatively and formerly identified as *Licea fimicola* Dearness & Bisby. This brings to 132 the total number of species of slime molds found to date in Florida. Most of the species listed below as having been found within the boundaries of the park occur commonly in

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southeastern United States. These few species are published now in order to provide park visitors with a list of species and to give them an even greater appreciation for its biotic diversity. It is hoped that the availability of such a list will stimulate further interest in the collection of Myxomycetes from this region.

Unless otherwise indicated, all collections were gathered on a single field trip of October 22, 1971. Despite the brevity of this sampling, no additional work in the Everglades is planned, hence the desirability of getting these data, and these new records, in print. Collection numbers (HWK) are my own. Specimens from the park have been deposited in the herbarium of the Everglades National Park. Names and format of families, genera, and species are those adopted by Martin and Alexopoulos (1969).

Myomycetes from the Everglades National Park and Adjacent Areas

Ceratiomyxaceae

Ceratiomyxa fructiculosa (Mull.) Macbr.

Two collections (HWK 784, 787), the latter from the dry pinelands, on well-decayed coniferous wood. This is a morphologically variable species with at least four described varieties, none of which is recognized by Martin and Alexopoulos (1969). Fructifications in the park consisted of erect unbranched pillars bearing subglobose spores 7–8 μ in diameter.

Liceaceae

Licea sp.

Collections I have examined include CJA, Florida #36 (Florida Herbarium #44015) and CJA, Florida #30, both from the Crystal River area, Citrus County, developed in moist-chamber culture on rind of *Sabal palmetto*, March 29, 1953. These specimens were tentatively identified by Alexopoulos (1953) as *Licea ?fimicola*. The collection CJA Florida #30, deposited in the University of Iowa Myxomycete Collection, bears the annotation *Licea minima* Fries in Dr. G. W. Martin's own hand. This probably accounts for the deletion of *L. fimicola* as occurring from Florida in Martin and Alexopoulos (1969). Alexopoulos (1953) notes that the sporangia ". . . generally bear a cone of debris which gives them an erect appearance not unlike that of a perithecium of the Fimetariaceae." The small size and perithecial-like nature of the sporangia may be the reason that collectors have overlooked this species in the field or dismissed it as an ascomycete. Nevertheless, this material represents an undescribed species and should not be confused with either *L. fimicola* or *L. minima*. It has been found on the bark surface of living Red Cedar from at least seven stations in Kentucky. The valid publication of this species will appear elsewhere, but a brief description of the Florida material is given below.

Sporangia scattered to gregarious, sessile, the body globose or globoid 50–60 μ in height, but appearing more or less conic by the deposition of gelatinous refuse apically on the sporangial wall, light-brown to black, somewhat iridescent on the lateral walls, 80 μ wide at the base, 80–100 μ in total height; peridium membranous, brownish, minutely and closely papillose on the inner surface; dehiscence irregularly by the lateral walls; spores dark brown to black in mass, dark olivaceous brown by transmitted light, globose, smooth, with a thin-walled pale area over ⅓ to ½ of the surface, 12–13 μ in diameter.

Reticulariaceae

Dictydiaethalium dictyosporum Nann.-Brem.

On a well-decayed log, Wild Orange Trail, Highland Hammock, Highlands County, HWK 910, January 22, 1972. This species is known only from the type collection, B.M. 3692, gathered in New Caledonia. The Florida material agrees well with Nannenga-Bremekamp's (1966) original description, except that the caps of the component sporangia range in size from 80 to 100 μ in diameter, slightly

larger than in the type, and the pseudocapillitium lacks the thickening and the minute warts on one side of the threads. Nannenga-Bremekamp's figure C is a good likeness of the surface ornamentation (incomplete bordered reticulum) of the spore. Examination of the type slide confirmed the similarity of spore ornamentation, but spore size is slightly larger in the Florida material, 11–13 μ in diameter excluding ornamentation, 12–14 μ in diameter including border. According to Nannenga-Bremekamp (1966), this species differs from *Dictydiaethalium plumbeum* (Schum.) Rost. in the smaller size of the sporangial caps, in the pseudocapillitial threads being warted and thickened on one side, and in the olivaceous color of the spores in mass, but in all of these cases the characters overlap in both species. Spore ornamentation is markedly different; in *D. dictyosporum*, a broken episporic reticulum in optical section appears as a partial border, and in *D. plumbeum*, ornamentation is uniformly and minutely spinulose. On the basis of spore ornamentation alone, in the absence of intermediate characters, it appears best to retain both *D. dictyosporum* and *D. plumbeum* as autonomous species.

Cribrariaceae

Cribraria violacea Rex

Three sporangia found on the bark surface of living *Vitis* (HWK 776). This species is cosmopolitan and common on living vines and trees.

Trichiacea

Arcyria cinerea (Bull.) Pers.

Two collections (HWK 780, gathered by Mrs. Mina Robinson, September 3, 1971, and 625) both on decayed wood. The basal threads at or near the point of attachment to the calyculus were completely smooth; elsewhere the threads were spinulose. Spores measured 7 μ, with scattered warts in clusters.

Arcyria denudata (L.) Wettst.

Two collections (HWK 782, 785) on well-decayed wood. This species is found worldwide and is common on the forest floor in the park area. The firm attachment to the capillitial threads to the plicate basal cup is the mark of this species.

Arcyria pomiformis (Leers) Rost.

This specimen (HWK 626), collected by Mrs. Mina Robinson on September 3, 1971, is a new record for Florida. The ochraceous sporangia were scattered over the bark of a dead branch on the forest floor. This species can be distinguished from the closely related *A. cinerea* by its smaller size (sporangia 1.0 mm in total height); its strongly ornamented capillitial threads (spiny or prominent reticulations), both above and below at the point of firm attachment to the calyculus; and its slightly larger spores (9–10 μ in diameter). Farr (1962) critically compared *A. pomiformis* and *A. cinerea* and concluded, in part, that the markings on the calyculus distinguished these two species: prominent papillae and coarse more or less reticulate patterns in *A. pomiformis*, compared with the smooth or stippled fine lines in *A. cinerea*. In the specimens cited here, *A. pomiformis* and *A. cinerea* had similar markings on their cups.

Perichaena depressa Libert

Most monographs give the habitat for this species as decayed wood or bark. It is perhaps even more common, at least in Florida, on the bark surface of living *Juniperus silicicola* (Small) Bailey. Hundreds of the typically flattened sporangia, each with a well-marked yellow border, were collected from the bark surface of living *Vitis* (HWK 776). Capillitial threads clearly show the partial septations.

Stemonitaceae

Stemonitis ?flavogenita Jahn

Until the type of this species is examined, these specimens are only provisionally assigned here. One collection (HWK 779), on the bark of a decaying log, agrees well with the published descriptions, except for the overall height (5.0–5.5 mm,

with the stalk 2.0–2.5 mm in length). There is no apical disc, and membranous expansions were not seen in the capillitial system. The surface net is united into a meshwork 20–30 μ in diameter. Another specimen (HWK 786), on the bark surface of living *Vitis*, has the apical disc and membranous expansions in the capillitial system, but the evenly warted spores are 9–10 μ in diameter, overall height is only 2.3–2.5 mm, with the stalk only up to 0.5 mm long or almost totally suppressed and the surface net with meshes 15–60 μ in diameter. The habit is far too small for typical *S. flavogenita*. Nevertheless, the differences exhibited by this specimen are within the limits to be expected when fruitings occur on living vines and trees.

Stemonitis herbatica Peck

Two collections from decaying Live Oak leaves, the first from two miles east of Gainesville, near State Road 20, Alachua County, HWK 327, July 28, 1971; the second at Devil's Millhopper, Gainesville, Alachua County, HWK 978, July 2, 1971. This species has the habit and color of *S. inconspicua* Nann.-Brem. and may be confused with that species in the field. These specimens are referred to this species because of the fine-meshed persistent surface net, the few capillitial expansions, and the violaceous, pale-brown uniformly and minutely warted spores 8–9 μ in diameter.

Stemonitis inconspicua Nann.-Brem.

On Live Oak leaf litter, approximately two miles east of Gainesville, near State Road 20, Alachua County, HWK 974, July 1, 1972; on fallen leaves, Hawthorne fields near Gainesville, Alachua County, collected by Erdman West and determined as *Stemonitis virginiensis* Rex by Robert Hagelstein, Florida Herbarium #22391, June 30, 1940. Madame Nannenga-Bremekamp has kindly confirmed the identification of HWK 974. Her original description agrees well with the Florida specimens, but her measurement of the total heights of the sporangia is given as 1.5–2.5 mm; the Florida specimens are taller (2.5–3.5 mm in height) and the spores are slightly larger (spore body 7–9 μ in diameter, including border 8.5–10.5). The episporic reticulum may reach 1 μ in height. Prior to this time this species has been known only from the Netherlands and the British Isles. The Florida specimens represent the first published report for the New World. *Stemonitis inconspicua* is perhaps most easily confused with *Stemonitis trechispora* (Berk.) Macbr. Sporangia of *S. trechispora* are more darkly colored, generally almost black, and are more densely clustered than are those of *S. inconspicua*. However, these two species differ most strikingly in their spores. The spores of *S. trechispora* are marked with a fine small-meshed unbroken episporic reticulum with 11–25 meshes per hemisphere, appearing in optical section 10–12 μ in diameter excluding the ornamentation, and with an inconspicuous border less than 0.5 μ. In contrast, the spores of *S. inconspicua* have a coarse wide-meshed unbroken episporic reticulum with 2–5 meshes per hemisphere.

Comatricha subcaespitosa Peck

A single gathering from a decaying *Philodendron* leaf, Homestead, Dade County, collected by R. A. Conover, Florida Herbarium #44510, #44511, #44512, May 27, 1955. Martin and Alexopoulos (1969) give the geographical range of this species as being as far south as North Carolina. This find extends the range to the southern tip of Florida. Both Hagelstein (1944) and Martin and Alexopoulos (1969) report the habitat of this species as dead wood. The occurrence of this specimen on a decaying leaf might leave this determination open to question, but the presence of a surface net with few free ends, the small caespitose sporangia 1.6 to 2.5 mm in total height with short stalks 0.5 mm, and the uniformly spinulose spores 7.5–8.5 μ in diameter all indicate that this specimen belongs here.

Physaraceae

Physarum galbeum Wingate

On bark, Gainesville, Alachua County, collected by George F. Weber, #9655,

June 18, 1934. For some unknown reason, this species was not included in West's list of Myxomycetes from Florida (1939) nor in Hagelstein's Mycetozoa of North America (1944), this in view of the fact that Hagelstein exchanged specimens and had extensive correspondence for a number of years with West. Martin and Alexopoulos (1969) gave the occurrence of this species as extending as far south as Virginia. This report extends the range of distribution still farther into Florida. The chrome-yellow sporangia, the total absence of a columella, and nearly limeless but abundant capillitium make this an easy species to identify in the field.

Physarum melleum (Berk. & Br.) Massee

On decaying twigs and leaves (HWK 777). This colorful species is extremely common in southeastern United States. The bright honey-colored sporangia with white calcareous stalks, the white or yellowish lime-knots, and the minutely warted pale-violet-brown spores 7.5–8.0 μ in diameter make this species easy to identify.

Physarum stellatum (Massee) Martin

On well-decayed wood (HWK 778). Although sporangia of this specimen do not show the typical stellate dehiscence of the peridium, the calcareous stalk, the white rounded lime-knots, the pseudocolumella, and the minutely warted spores 8–9 μ in diameter clearly identify this species.

Physarum tenerum Rex

Thirty-five gregarious nodding sporangia developed on the wood of a decorticated log (HWK 781). Widely distributed and certainly common throughout southeastern United States.

Didymiaceae

Didymium listeri Massee

On bark of *Ficus bengalensis*, fructifications developed in moist chamber August 31, 1951, collected by C. J. Alexopoulos near Hollywood Beach, Broward County, Florida Herbarium #44013. This specimen was misidentified and reported by Alexopoulos (1953) as *Diderma chondrioderma* (de Bary & Rost.) G. Lister. When the white eggshell-like peridium is broken, the minute stellate and rodlike pointed crystals are readily discernable. A brief description follows, since this specimen differs from the published descriptions of *D. listeri* in several characteristics.

Sporangia widely scattered, spherical to pulvinate, white, 0.1 to 0.3 mm in diameter; capillitium somewhat rigid with crossbars, pale at the tips; spores minutely warted, 11–12 μ in diameter.

The report in Martin and Alexopoulos (1969) of *Diderma chrondrioderma* from Florida is in error.

Didymium ovoideum Nann.-Brem.

On decaying leaf litter and twigs, Gainesville, Alachua County, HWK 240, collected by Mrs. Mina Robinson, March 1970. This collection represents the second record from the New World. Alexopoulos (1965) has previously reported this species from Texas. *Didymium ovoideum* is a most colorful and certainly a common species throughout the southeastern United States. I have made numerous collections of *D. ovoideum* in Georgia. In view of this it is quite probable that this species is frequently misidentified as *Didymium iridis* (Ditmar) Fries, which it resembles in general habit and morphology.

DISCUSSION

A specimen provisionally identified as *Stemonitis flavogenita* was collected on the bark surface of living grapevines. Myxomycetes that grow and fruit on the bark surface of living vines and trees have been described recently as corticolous Myxomycetes (Keller and Brooks, 1973). Fructifications of these slime molds are extremely small, commonly less than 0.5 mm in diameter, and represent a

richness of species diversity largely unexplored and unnoticed by collectors in the field. Accordingly, the findings of Alexopoulos (1970) that species diversity was lower in tropical rain forest of the Caribbean Islands than in the temperate zone forest may be open to question. His collections were mostly from ground litter (decaying leaves, twigs, and logs) and not from living trees. Much of the species diversity of the tropical rain forest includes thick-stemmed lianas, epiphytic orchids, bromeliads, mosses, liverworts, and lichens, and occurs above ground level in the upper canopy. It is quite possible that corticolous Myxomycetes may be added to these groups when the tropics become more completely explored over continuous periods of time.

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